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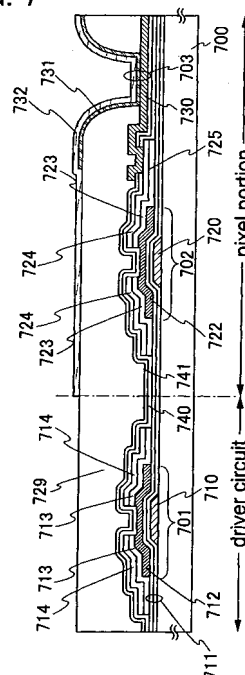
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(54) **Semiconductor device having oxide semiconductor layer and manufacturing method**

(57) The invention provides a semiconductor device comprising a gate electrode over a substrate; an insulating film over the gate electrode; an oxide semiconductor film over the gate electrode with the insulating film interposed there between; a channel protective film formed over the oxide semiconductor film; a source electrode and a drain electrode formed over the oxide semiconductor film and the channel protective film; and a passivation film comprising an insulating material formed over at least the source electrode, the drain electrode, the channel protective film and the oxide semiconductor film, wherein the oxide semiconductor film comprises an In-Ga-Zn-O based amorphous oxide semiconductor.

**FIG. 7**





## EUROPEAN SEARCH REPORT

Application Number  
EP 08 01 6242

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	US 2004/155846 A1 (HOFFMAN RANDY [US] ET AL) 12 August 2004 (2004-08-12) * paragraph [0027] - paragraph [0028] * * paragraph [0047] - paragraph [0052] *	3,8-10	
Y	WO 2005/088726 A1 (JAPAN SCIENCE & TECH AGENCY [JP]; HOSONO HIDEO [JP]; HIRANO MASAHIRO [J]) 22 September 2005 (2005-09-22) * abstract *	1,3,8-10	
E	-& EP 1 737 044 A1 (JAPAN SCIENCE & TECH AGENCY [JP]) 27 December 2006 (2006-12-27) * paragraph [0015] * * paragraph [0136] *	1,3,8-10	
A	NOMURA K ET AL: "Room-temperature fabrication of transparent flexible thin-film transistors using amorphous oxide semiconductors", NATURE, NATURE PUBLISHING GROUP, LONDON, GB, vol. 432, no. 25, 25 November 2004 (2004-11-25), pages 488-492, XP002410190, ISSN: 0028-0836, DOI: 10.1038/NATURE03090 * the whole document *	1,3,8-10	
<del>The present search report has been drawn up for all claims</del>			TECHNICAL FIELDS SEARCHED (IPC)
			H01L
Place of search Berlin		Date of completion of the search 29 August 2011	Examiner Hoffmann, Niels
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1, 3(completely); 8-10(partially)

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number

EP 08 01 6242

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1, 3(completely); 8-10(partially)

Semiconductor device having a semiconductor film which comprises In-Ga-Zn-O based amorphous semiconductor  
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2. claims: 2, 4, 6, 11(completely); 7-10(partially)

Semiconductor device having source and drain electrode comprising a titanium film  
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3. claims: 5(completely); 7-10(partially)

Semiconductor having a first and a second gate electrode connected to each other  
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 01 6242

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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29-08-2011

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82